**BINAKAYAN NATIONAL HIGH SCHOOL**

**Science Investigatory Project**

**M**ain solution **O**n our infertile soil **O**ver our **N**ature to plant ***Bin****hi*

‘MOON BIN Solution

**STUDENT RESERSEARCHS:**

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**INTRODUCTION**

**BACKGROUND OF THE STUDY**

Many of us want to plant fruits, vegetables and other plants in our backyard but there is one reason why we can't plant easily. It is because of infertile soil. In planting, there are many reasons why our plant doesn't live enough or doesn't grow enough. One of them is having an infertile soil.

Soil preparation in planting is critical especially if the soil you are going to use is infertile. Soil provides a healthy life to a plant. The infertile soil has many effects such as unproductive land for agriculture, creates new deserts, and can pollute waterways (WWF, 2022). Because of these effects, we can use an alternate and effective solution.

This research also aims to prove that the ‘’MOON BIN SOLUTION’’ is more cheap and is more likely effective and is more harmless fertilizer than the other fertilizer in our market. This product will help people who love to plant especially farmers.

In making our solution we will use the 3 elements that give nutrients to the plant which are *nitrogen*, *phosphorus* and *potassium* (SoilSenseLeaflet, 1992). We will be getting our components out of fruits so that they won't be harmful to our environment. There are a lot offruits where we can obtain these components such as pineapples, bananas, etc. (SoilSenseLeaflet, 1992).

We will use the peels of the fruits to make it more useful. In this research our specific target type of soil is dry soil.Dry soils have a deficit of moisture, are low in soil organic matter, and are prone to erosion, fertility loss, salinization, and desertification (Reynolds et al., 2007). So this is the right infertile soil we need in this research.

We will be using the foliar feed method to apply on the dry soil, because it is a more effective method to apply when it comes to any type of soil (UF,2021), specifically dry soil. The specific kind of plant that we will be using in this research is tomato(*Solanum lycopersicum*) plant We will also add some other materials like *zinc,* and other *metal elements* to enhance our liquid fertilizer for dry soil.

**STATEMENT OF THE PROBLEM**

**GENERAL OBJECTIVES**

Our study "M-ain solution, O-n infertile soil, O-ver our, N-ature to plant, Bin-hi or simply MOON BIN SOLUTION" aims to make a solution for plants to grow big and healthy even in infertile soil.

**SPECIFIC OBJECTIVES**

Specifically, this research is to answer the following questions:

1. Are there any significant changes in the effectiveness of ‘’MOON BIN SOLUTION’’ as a residue in infertile soil in connection of:

1.1What does the solution specifically do to the soil or the plant?

1.2 Does it work for any type of soil?

1.3 What is the life span of a plant after using the solution?

2. Are there any significant changes in the effectiveness of ‘’MOON BIN SOLUTION’’ as a residue in planting using infertile soil in connection of:

2.1 Plant growth?

2.2 Number of tomato fruit?

2.3 Number of leaves?

**HYPOTHESIS**

The study and the researchers hypothesized that:

1.1 There has no change that has occurred in the effectiveness of using "Moon Bin Solution" as a fertilizer for dry soil *(Aridisols)* regarding soil texture, soil moisture, and plant effectiveness.

1.2 There has been a change in the effectiveness of using "Moon Bin Solution" as a fertilizer for dry soil *(Aridisols)* regarding soil texture, soil moisture, and plant effectiveness**.**

**SCOPE AND LIMITATIONS**

This research is focused only on observing the effectiveness of ‘’MOON BIN SOLUTION’’ as a soil fertilizer for dry soil and effectiveness to the growth of tomato(*Solanumlycopersicum*)plant (The Spruce,2023). In this study, we will only use foliar feed method application.

This study has one (1) kind of independent variable and two (2) dependent variables, the independent variable is the efectiveness of ‘’MOON BIN SOLUTION’’ as a soil fertilizer while the dependent variable of this study are (1) the improvement of dry soil in terms of soil texture, soil moistureand (2) the growth of tomato (*Solanumlycopersicum*) plant in terms of plant height, average leaf length, and number of leaves.

The dry soil was gathered from the researcher's backyard while the tomato (*Solanumlycopersicum*) plant seeds were collected from the researcher's neighbor. The experiment will be conducted at the researcher's house in Brgy. Aplaya, Binakayan, Kawit, Cavite. It will be supervised throughout the school year 2023-2024.

**SIGNIFICANCE OF THE STUDY**

This research is to help not only farmers but the whole agricultural industry:

*Farmers*

Farmers is the major beneficiary in this study. This can help them to plant efficiently in dry soil. They can properly use fertilizer without the plant being harmed. This product is cheaper and affordable so they can buy it anytime.

*Plant Lovers/Plant Collectors*

Plant lovers now can plant in a dry soil without worrying in the life span of the plant. It can also help collectors to collect more plants without buying an effective soil. It will be more efficient for them to keep their plant onto their home.

*Agricultural Students*

It can help students to plant onto the areas without effective soils. It will be more accessible for them to be more focused in their studies. They don’t need to find soils that they can use, instead they will just buy our product.

*Mother Earth/ Environment*

Our economy will be more productive because our product is harmless. It can be safe for the environment. We will be just using this product that can be more effective and harmless than the industry fertilizer.

*Agricultural Researchers and Scientists*

This study will provide valuable insights and data for agricultural researchers and scientists in their ongoing efforts to develop more efficient and sustainable farming practices. By understanding the best practices for planting in dry soil and the effective use of fertilizers, they can contribute to the development of new techniques, products, and innovations that can promote sustainable agriculture and food security worldwide.

*Local and National Governments*

As agricultural productivity increases, governments will see positive effects on the economy, employment, and overall quality of life for their citizens. By understanding and adopting policies based on this research, governments can help ensure food security, as well as work on conserving and rehabilitating the environment. This will also help them in efficiently allocating resources for agricultural programs and ensuring the growth of the sector.

*International Aid Organizations*

Aid organizations focused on agriculture and food security can benefit from this study's findings, as they can use the knowledge gained to better design and implement projects in regions with arid or semi-arid climates. This will lead to higher success rates and increased food production in some of the more vulnerable communities around the world.

*Market Sellers and Consumers*

The results of this study will ultimately lead to an increase in the variety and availability of agricultural products in the market. This will benefit market sellers through increased sales and consumers by providing lower prices and a wider selection of fresh produce. Also, the increased productivity may lead to opportunities for export, thus expanding the market reach and benefiting trade relations.

In summary, this research has the potential to positively impact and benefit multiple stakeholders in the agricultural industry, from farmers and plant lovers to students, environmentalists, researchers, governments, aid organizations, market sellers, and consumers. By improving our understanding of planting in dry soil conditions, we can foster sustainable and efficient agricultural practices that can help feed our growing global population, protect the environment, and enhancelocal and international economies.

**DEFINITION OF TERMS**

The following are the important terms defined and defined in the study:

**Solution.** It is a liquid solution that made by mixing components.

**N.P.K.** This are the components used in making fertilizer. This are nitrogen, phosphorus, and potassium.

**Natural.** This is when the soil, plant and many more is made from components that is harmless.

**Agriculture.** This where we will take out the main product and where will we finally make out an accessibility.

**REVIEW OF RELATED LITERATURE AND STUDIES**

Pakilagay po ano yung mga statements or evidences nila sa ginawa nilang study na sa tingin nyo ay makakatulong po para maging matagumpay yung study na gagawin nyo naman.

**Oyewole CI, Ambakhian SO, Saliu OJ (2011)** Response of Tomato (*LycopersiconEsculentum*) and Okra*AbelmoscusEsculentus* (L.) Moench to Rates of NPK Nutrients Applied as Mineral, Poultry Manure and Oil Palm Residue in the Guinea Savanna Agro-Ecolohical Zone in Nigeria. Journal of International Scientific publication: Agriculture and Food 2(5): 212-218.

**Zenz DR, Peterson JR, Brooman DL, Lue-Hing C (1976)** Environmental Impacts of Land Application of Sludge. Water Pollution Control Federation 48(10): 2332-2342.

**Angers DA, N'dayegamiye A, Côté D (1993)** Tillage-induced differences in organic matter of particle-size fractions and microbial biomass. Soil SciSoc Am J 57(2): 512-516.

**METHODOLOGY**

**I. Preparation of 'MOON BIN SOLUTION'**  
  
Step 1: Gather the necessary components  
- Collect fruit peels from fruits rich in nitrogen, phosphorus, and potassium such as pineapples and bananas.  
- Obtain zinc and other metal elements from appropriate sources.  
  
Step 2: Preparation of solution -Wash the fruit peels thoroughly to remove any dirt or contaminants.  
- Cut the fruit peels into small pieces to enhance the extraction process.  
- Combine the fruit peels and metal elements in a large container.  
  
Step 3: Extraction process  
- Add enough water to cover the fruit peels and metal elements in the container.  
- Let the mixture sit for several days to allow the nutrients to leach out from the fruit peels into the water.  
- Stir the mixture occasionally to facilitate the extraction process.  
  
Step 4: Straining and filtration  
- After the extraction period, strain the mixture using a fine mesh or cheesecloth to remove any solid particles.  
- Filter the extracted solution using a coffee filter or filter paper to remove any remaining impurities.  
  
Step 5: Storage  
- Transfer the filtered solution into clean and sanitized bottles or containers.  
- Seal the containers tightly to prevent contamination and store them in a cool and dark place until ready for use.  
  
**II. Application of 'MOON BIN SOLUTION' using Foliar Feed Method**  
Step 1: Soil preparation  
- Prepare the dry soil by removing any debris and loosening its structure to improve water and nutrients penetration.  
- Ensure that the soil is properly leveled and free from any existing plants or weeds.  
  
Step 2: Dilution of 'MOON BIN SOLUTION'  
- Depending on the concentration of nutrients in the solution, dilute the 'MOON BIN SOLUTION' with water at a recommended ratio (e.g., 1:10, 1:20, etc.).  
- Mix the solution thoroughly to ensure proper distribution of nutrients.  
  
Step 3: Application to the dry soil (Aridisols)  
- Use a sprayer or spray bottle to apply the diluted 'MOON BIN SOLUTION' evenly on the dry soil.  
- Apply the solution in a fine mist, covering the entire surface of the soil.  
- Take care not to over-saturate the soil as it may lead to nutrient leaching or water logging.  
  
Step 4: Planting of tomato (*Solanum lycopersicum*) seeds  
- Create small holes or furrows in the treated soil using a gardening tool.  
- Place the tomato seeds in the prepared holes, following the recommended spacing and depth for tomato planting.  
- Cover the seeds with soil gently and lightly press down to ensure good seed-to-soil contact.  
  
Step 5: Regular maintenance and observation  
- Water the planted seeds regularly to keep the soil moist but not overly saturated.  
- Observe the growth and development of the tomato plants, including plant height, leaf length, and number of leaves.  
- Monitor any changes in soil texture, moisture, and overall plant health.  
  
Step 6: Data collection and analysis  
- Record the data observed, including plant growth measurements, number of tomato fruits, and number of leaves.  
- Analyze the data using appropriate statistical methods to determine any significant changes or effects caused by the 'MOON BIN SOLUTION'.

**RESEARCH DESIGN:**  
  
Independent Variable:  
Effectiveness of "MOON BIN SOLUTION" as a soil fertilizer for dry soil   
   
Background questions: What does the solution specifically do to the soil or the plant?  
Does it work for any type of soil?  
What is the lifespan of a plant after using the solution?   
   
Dependent variable: Improvement of dry soil in terms of soil texture and soil moisture.  
Growth of tomato (Solanum lycopersicum) plant in terms of plant height, average leaf length, and number of leaves.  
  
Constant:  
Foliar feed method application.  
  
Quantitative Variable:  
Improvement of dry soil measured by soil texture and soil moisture.  
  
Qualitative Variable:  
Growth of tomato (Solanum lycopersicum) plant observed through plant height, average leaf length, and number of leaves.  
  
Experimental Design:  
  
Obtain samples of dry soil from the researcher's backyard.  
Collect tomato (Solanum lycopersicum) plant seeds from the researcher's neighbor. **PHASE I: Gathering and Preparation of Materials**

1.Prepare and equip your PPE (Personal Protective Equipment) before proceeding and make sure to check the equipments.  
  
2.Harvest the bananas required to extract the necessary components (nitrogen, phosphorus, and potassium) for the solution.  
  
3.Collect dry soil from the researcher's backyard.  
  
4.Gather tomato (Solanum lycopersicum) plant seeds from the researcher's neighbor.  
  
5. Acquire additional materials like zinc and other metal elements for enhancing the liquid fertilizer.  
  
6. Set up a designated area for the experiment at the researcher's house in Brgy. Aplaya, Binakayan, Kawit, Cavite.  
  
7. Prepare necessary tools and equipment for the experiment, including containers for the solution, planting pots for the tomato plants, measuring instruments, etc.

**PHASE II: Experimentation**1. Mix the extracted components from the fruits (nitrogen, phosphorus, and potassium) to create the "Moon Bin Solution."  
 2. Apply the "Moon Bin Solution" using the foliar feed method on the dry soil, ensuring equal distribution.  
  
3. Plant the tomato (Solanum lycopersicum) seeds in the treated soil.  
Monitor and observe the growth of the tomato plants, including plant height, average leaf length, and number of leaves.  
  
4.Conduct regular watering and maintenance procedures as necessary.  
  
5. Record and document the changes and progress of the plants throughout the experiment.

**PHASE III: Analyzing Data**

1. Measure and analyze the collected data regarding the effectiveness of the "Moon Bin Solution" on the treated soil and tomato plants.  
  
2. Evaluate the changes in soil texture, soil moisture, and plant effectiveness after using the solution.  
  
3. Assess the impact of the "Moon Bin Solution" on plant growth, the number of tomato fruits, and the number of leaves.  
4. Compare the results with the initial hypotheses to determine if there have been significant changes in the effectiveness of the solution.  
  
5. Present the findings using appropriate graphs, tables, and statistical analysis.  
  
6. Draw conclusions based on the data analysis and make recommendations for further research or improvements to the solution.

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